TRANSVERSAL TECHNOLOGICAL SKILLS FOR THE ORNAMENTAL ROCK INDUSTRY FOCUSING ON THE APPLICABILITY OF BLOCKCHAIN IN A CIRCULAR ECONOMY 2023-1-DE02-KA220-ADU-000166863

Co-funded by the European Union

WP4-A6. Pedagogical test and implementation of IT improvements of Interactive RockChain Tool.

Consortium members: Deutscher Naturwerkstein-Verband e.V. (DNV), Asociación Empresarial de Investigación Centro Tecnológico del Mármol, Piedra y Materiales (CTM), Universitatea Transilvania din Brasov (UNITbv), Klesarska skola (KSK).

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Contents

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1. INTRODUCTION

This document presents the results of activity WP4-A6 "Pedagogical test and implementation of IT improvements of Interactive RockChain Tool", developed within Work Package 4 of the RockChain project.

Following the refinement and stabilisation work carried out in previous WP4 activities, the Interactive RockChain Tool was tested with external pedagogical experts (adult education and vocational training profiles) to validate its suitability as a classroom-ready serious game and to identify realistic improvements that enhance learning outcomes, facilitation and inclusiveness.

The purpose of this report is to summarise the feedback collected through a structured online questionnaire, highlight the main strengths and weaknesses identified by the evaluators, and document the IT improvements that were prioritised and implemented in the updated build used for pilot preparation.

The Interactive RockChain Tool and other public project outcomes are accessible through the RockChain project website: https://rockchain.eu/

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2. EVALUATION QUESTIONNAIRE

Each partner sent the questionnaire to external pedagogical experts, ensuring a balanced panel covering complementary perspectives: adult/VET trainers in circular economy and waste management, serious-games and learning-design researchers, accessibility and inclusion specialists, and industry training managers.

A total of 6 experts completed the questionnaire (100% completion rate). The questionnaire contains 7 questions, combining Likert-scale items (overall satisfaction, content clarity, visual design, classroom integration, inclusion and motivation) and an open question to collect concrete improvement proposals.

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2.1. EVALUATION QUESTIONNAIRE

Below is the questionnaire carried out for the technical evaluation of this project and its products:

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2. General questions. To what extent do you agree with the following statements?

	Fully disagree	Rather disagree	Neither agree nor disagree	Rather agree	Fully agree
The content is relevant and appropriate for the age and level of the student	○	○	○	○	○
The tool present the information clearly and accurately.	○	○	○	○	○
The vocabulary used is understandable to students.	○	○	○	○	○
Tool show how to use the blockchain in the waste management.	○	○	○	○	○
Tool enable user training for applied blockchain technology in the rock waste management.	○	○	○	○	○

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3. In terms of technical contents to what extent do you agree with the following statements?

	Fully disagree	Rather disagree	Neither agree nor disagree	Rather agree	Fully agree
The design is visually appealing and appropriate for the audience.	○	○	○	○	○
Images and graphics support or reinforce the textual content of the Tool.	○	○	○	○	○
Text size is legible.	○	○	○	○	○
The colors and format make the content easy to understand.	○	○	○	○	○

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4. Thinking about its use in the wing or educational setting, to what extent do you agree with the following sentences?

	Fully disagree	Rather disagree	Neither agree nor disagree	Rather agree	Fully agree
Tool is easy to integrate into daily classroom activities	○	○	○	○	○
Tool allow group work	○	○	○	○	○
Encourage collaborative learning	○	○	○	○	○

5. In terms of diversity and inclusion:

	Fully disagree	Rather disagree	Neither agree nor disagree	Rather agree	Fully agree
Tool is designed to accommodate different learning styles (visual, auditory, kinesthetic).	○	○	○	○	○
Tool is accessible to students with special needs.	○	○	○	○	○

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6. Finally, on motivation and participation how do you agree with the following:

	Fully disagree	Rather disagree	Neither agree nor disagree	Rather agree	Fully agree
Tool is motivating for students.	○	○	○	○	○
Tool includes elements that encourage interest or curiosity about the topic.	○	○	○	○	○

7. Do you have any further comments and recommendations on the Tool? What could have been done better?
Please, tell us what kind of improvement you can suggest:

Tu respuesta

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Enviar   Borrar formulario

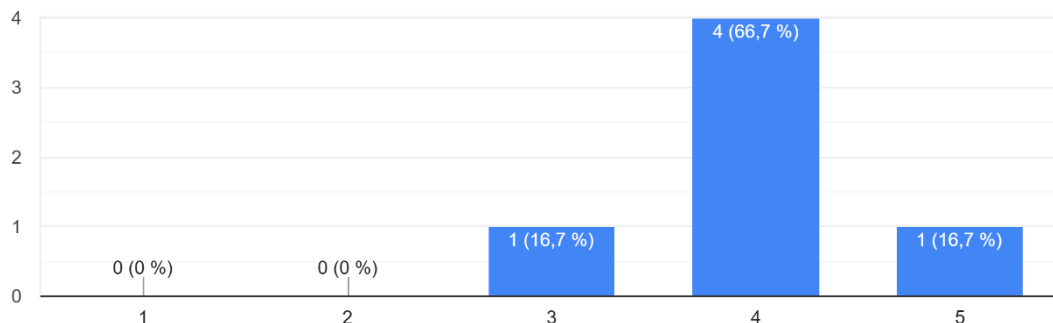## 2.2.   RESULTS OF THE QUESTIONNAIRE

A total of six pedagogical experts completed the questionnaire.

Q1 – Overall satisfaction (scale 1–5):

The mean score was 4.0/5, with the following distribution: one rating of 3, four ratings of 4, and one rating of 5.

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1. Overall, how satisfied were you with the RockChain Interactive Tool?
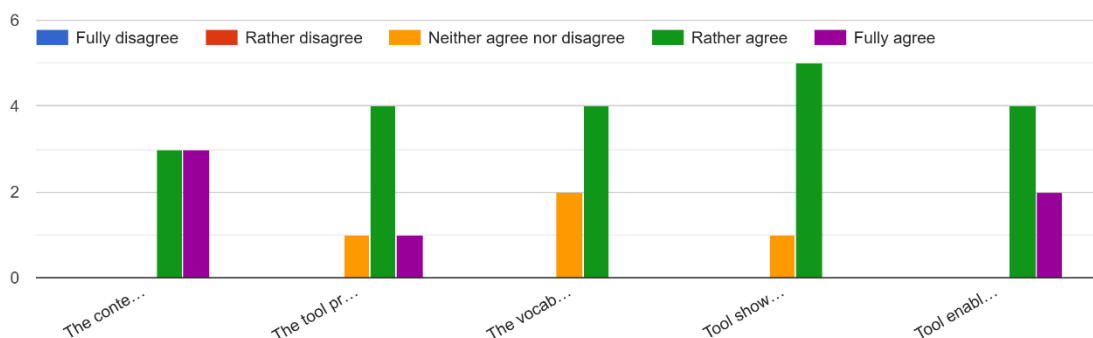
6 respuestas

Q2 – General perception (content and relevance):

All respondents agreed that the tool's content is relevant and appropriate for the intended target group, and that it can effectively support applied training on blockchain-enabled traceability in waste management. Minor reservations were mainly associated with:

- the presence of specialised terminology that may be challenging for first-time learners, and

- the need to make "blockchain" concepts more concrete through clearer in-app examples or simplified explanations.

2. General questions. To what extent do you agree with the following statements?

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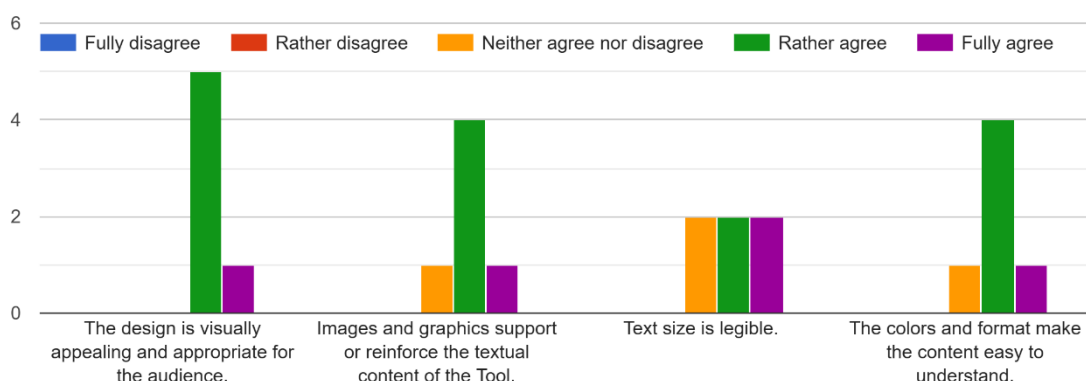
ROCKCHAIN

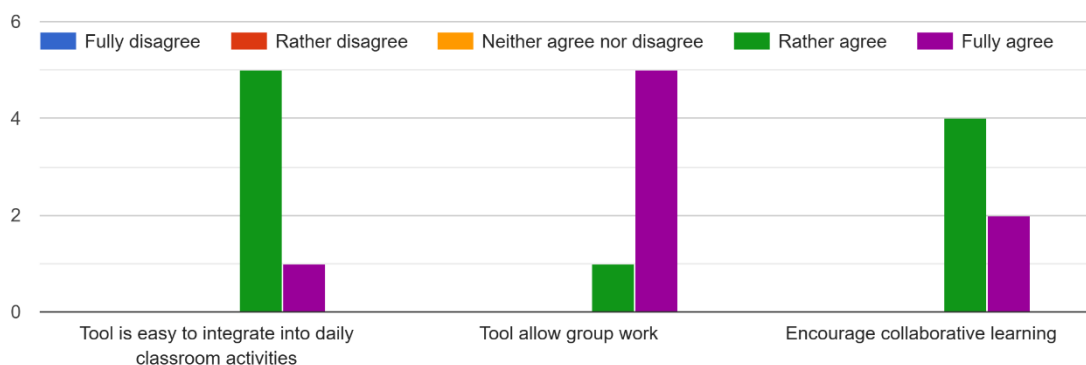## Q3, Q4 – Design, usability and educational integration:

Feedback was consistently positive regarding visual coherence, readability, and the tool's practical suitability for classroom/workshop use, particularly in group-based learning contexts. Experts highlighted that the round-based structure:

- supports collaboration naturally, and;

- can be integrated into facilitated sessions with limited preparation time.

3. In terms of technical contents to what extent do you agree with the following statements?

4. Thinking about its use in the wing or educational setting, to what extent do you agree with the following sentences?

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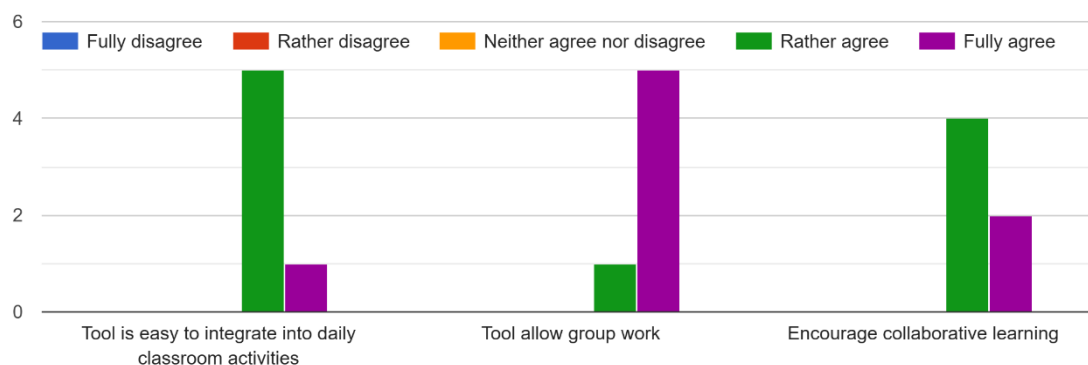**ROCKCHAIN**

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Q5 – Diversity and inclusion:

While experts generally agreed that the tool can accommodate different learning styles, accessibility for learners with special needs emerged as the main improvement area. Responses split into:
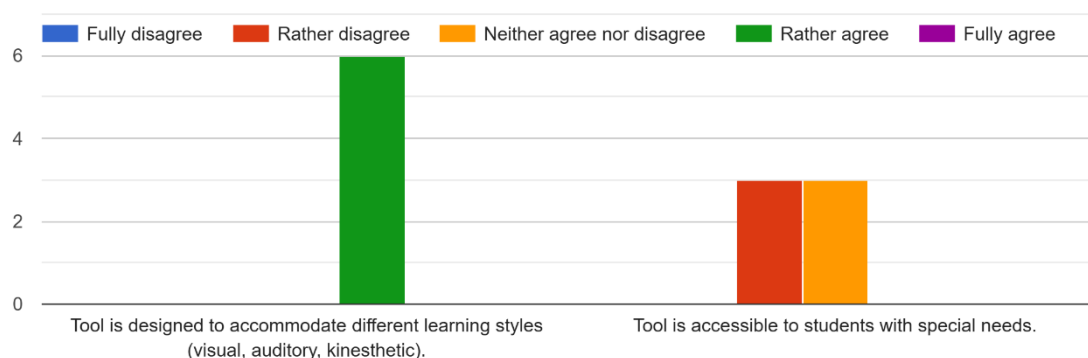
- 50% disagreement,

- 50% neutral ratings, i

Indicating that accessibility measures are not yet sufficiently explicit or robust.

4. Thinking about its use in the wing or educational setting, to what extent do you agree with the following sentences?

5. In terms of diversity and inclusion:

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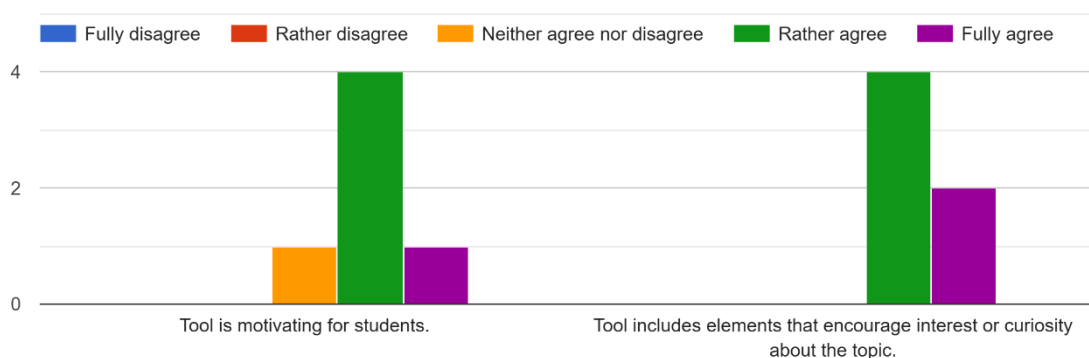
Q6 – Motivation and engagement:

The tool was perceived as motivating and effective at stimulating curiosity, especially when used as a discussion trigger followed by a guided debriefing to connect gameplay decisions with real-world practices.

6. Finally, on motivation and participation how do you agree with the following:

7. Do you have any further comments and recommendations on the Tool? What could have been done better?
Please, tell us what kind of improvement you can suggest:

6 respuestas

As a group experience, it is fine, but it lacks a layer of explicit accessibility: configurable font size, high contrast, and clear alternatives when there is time pressure. It would also help to incorporate consistent iconography for waste/actions and a "low stress" mode (more time and fewer simultaneous elements) for certain groups.

The tool already feels like it belongs in the classroom: participants have a better understanding of the meaning of the awards and the phases, and reflection can be guided at the end of each round. As an improvement, I would suggest a downloadable summary for the trainer with simple indicators (waste reduced, best strategies, etc.), even if it is basic.

I like it as a decision simulation (buy/transform/reduce waste), but the term "blockchain" can be abstract: I would add a very simple "traceability log" type panel (what action was recorded and why it matters). And I would revise some of the text to make it even more "real industry" (examples of waste and typical destinations).

The round-based flow works well to energise a session and open up discussion. I would add a mini-glossary (waste streams, rewards, blockchain terms) accessible from the header and a final debrief screen with 3–4 guiding questions to connect decisions made in the game with real classroom/company practices.

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Very good potential as a "discussion starter", but the action→concept relationship should be reinforced with more explicit micro-feedback (e.g., "this action improves traceability/reduces landfill"). I also recommend a difficulty/pace option (slow/standard timers) for audiences with low digital competence.

For the first session, I would add an optional "guided first round" (3 screens explaining objectives, resources, and what to look for in the header) and a contextual help button. It is also key to plan a more systematic usability evaluation with +45 and low digital competence to validate UX decisions.

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3. CONCLUSIONS

Overall, the pedagogical assessment of the *Interactive RockChain Tool* was positive and confirmed that the updates made in WP4 led to a serious game that's ready to be used in classroom settings, particularly in adult education and vocational training (VET).

Experts pointed out three main strengths:

- The relevance of the content to current challenges in circular economy and waste management within the ornamental stone sector.
- A dynamic, round-based format that encourages teamwork and makes facilitation easier.
- Clear potential to spark meaningful discussions around traceability, decision-making, and sustainability.

Based on qualitative input (Q7), the consortium prioritized and incorporated several IT enhancements into the updated version used for pilot preparation:

- An optional guided onboarding for first-time users, with brief intro screens that explain objectives, phases, and key indicators.

- More direct micro-feedback that links in-game actions to circular economy concepts like traceability, waste reduction, and recovery routes.

- Lightweight "traceability log" messages to help make the blockchain metaphor more tangible without adding extra cognitive load.

- Adjustable pacing settings for adult learners, such as 'standard' and 'slow' timers, to better accommodate varying levels of digital skills.

- Further simplification and consistency in the game's language, including clearer industry examples, more intuitive waste/destination labels, and improved prompts for the debrief phase.

Additional enhancements focused on accessibility, such as scalable font sizes, a high-contrast mode, and low-stress gameplay options, were also identified. A session summary export feature for trainers was flagged as a valuable addition for future versions. These improvements have been logged for upcoming iterations, depending on pilot feedback and technical feasibility.

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